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"Emergency" definitive reconstruction of a necrotising fasciitis thigh debridement defect with a pedicled TRAM flap

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ABSTRACT

INTRODUCTION: Necrotising fasciitis (NF) is a rare, severe, rapidly progressing and life-threatening synergistic infection primarily affecting the superficial fascia. A novel method of definitive and aesthetic reconstruction of NF thigh defects by using a pedicled transverse rectus abdominis myocutaneous (TRAM) flap without recourse to temporising skin grafts is presented.
PRESENTATION OF CASE: A 30-year-old parous woman presented in extremis with fulminant NF of her left anteromedial thigh. Following emergency radical debridement and intensive care stabilisation she was reconstructed 48 h later in a single stage with a pedicled TRAM flap islanded on the ipsilateral deep inferior epigastric vessels. There was excellent contour restoration of her thigh and coverage of the exposed femoral vessels.
DISCUSSION: Pedicled flaps based on the rectus abdominis muscle provide a large, readily available reconstructive option for correction of substantial regional defects as herein illustrated. They are robust when based on dominant inferior vascular pedicle with a long reach and wide arc of rotation when designed transversely (as a TRAM flap).
CONCLUSION: This case also illustrates that definitive flap reconstruction of NF can be successfully undertaken in the emergent setting, thereby negating the need for large areas of skin grafting which can lead to contractures with consequent functional impairment and suboptimal aesthetic results.

1. Introduction

Necrotising fasciitis (NF) is a severe, rapidly progressive and life-threatening infection that primarily affects the fascia and soft tissues with relative sparing of skeletal muscle. As the disease progresses, systemic manifestations of septic shock develop with coagulopathy and multiple organ failure. NF can be categorised into subtypes depending on microbiological culture: type I is polymicrobial whereas type II is monomicrobial and largely attributable to Lancefield Group A (β-haemolytic) streptococci. The incidence of necrotising fasciitis varies depending on the geographical location, age and ethnicity,[1] but it is thought to be increasing due to the emergence of subtypes that have low population immunity.[1–3] For young healthy patients that have not undergone recent surgery, monomicrobial infections are the commonest.[4] Mortality is high (20–34%) and may be correlated to age, intravenous drug abuse, immunosuppresion and other co-morbidities.[1,5,6] In addition, mortality correlates with clinical progression and positivity of blood cultures.[7]

Effective treatment comprises radical disfiguring debridement of affected tissues and traditionally split-skin grafting often with poor cosmetic results. In the long run the skin grafted areas are not only unsightly but can result in functional impairment especially in affected limbs.

2. Presentation of case

A previously fit and healthy 30-year-old woman with no significant past medical history presented with a four-day history of increasing pain and redness of her left thigh to an alternative medical facility. She was a full-time mother and denied any recent trauma or unusual activities from her standard schedule. An area of cellulitis over her left thigh was noted but she was advised to manage it conservatively. She re-attended the same medical facility the next day having developed fevers, rigours and increasing cellulitis. Consequently she was transferred to our hospital as an emergency under the care of the orthopaedic surgery team.

On examination an obvious area of cellulitis with an underlying palpable collection consistent with an abscess was noted. This was incised and drained under general anaesthesia. However, over the next few hours the patient continued to deteriorate with spreading cellulitis, increasing pyrexia (>40 °C), and cardiovascular

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Fig. 1. AP view of the patient following surgery. There is excellent coverage of the anteromedial thigh defect. Please note the abdominoplasty scar showing where the donor tissue was harvested from. The involved thigh is thinner or has less bulk than the opposite thigh thanks to the radical debridement in a manner similar to a groin dissection. The robust tissue was needed to adequately cover the femoral vessels and nerve and transposed to the recipient site on the antero-medial left thigh. This large flap covers all the major vessels in this area.

Fig. 2. An oblique view shows the excellent flap contour and the previous position of the umbilicus can be seen superomedially. There is a small area inferiorly that required split skin grafting.

and respiratory decompensation. The infection spread to cover a large area of the anteromedial aspect of her left thigh and groin but spared the perineum. Necrotising fasciitis (NF) was suspected and the patient referred to the on-call plastic surgery team.

She was immediately commenced on intravenous antibiotics and taken to theatre for extensive debridement of the anteromedial thigh skin, fat and fascia until healthy bleeding tissue was reached. The muscles were unaffected. There was a dramatic improvement in her condition intraoperatively as the debridement progressed. Postoperatively she was transferred to the Intensive Care Unit where she remained intubated for 72 h.

The diagnosis of NF was confirmed by the presence of penicillin-sensitive, group A *Streptococcus pyogenes* in wound swabs and histological examination. She underwent further debridement three days later which left her with a defect on the anterior thigh akin to a groin dissection wound and medially exposing the adductor muscles. Five days following her original debridement she underwent urgent reconstruction of her extensive full-thickness thigh defect.

A pedicled TRAM (transverse rectus abdominis myocutaneous) flap was raised based on the left ipsilateral deep inferior epigastric vessels and transposed into the defect superior to the inguinal ligament. A small posterior extent of the debridement was not covered by the TRAM flap and thus was resurfaced with a split-thickness skin graft harvested from her contralateral thigh (Fig. 1). The flap transfer was successful with no healing problems and the patient was discharged home 16 days post-reconstruction (three weeks post-admission).

On microbiological advice she was put on long-term prophylactic antibiotic treatment comprising Penicillin V (500 mg OD) that continued for a total of 2 years from the time of the initial diagnosis. Over the next fourteen months, the patient underwent two revisional surgeries consisting of liposuction of the TRAM flap (to reduce its bulk and facilitate its advancement) and serial excision of the skin grafted area with advancement of the TRAM flap to replace the skin graft. The patient was discharged 20 months from initial admission with a very good aesthetic result (Figs. 1–3).

3. Discussion

Traditional reconstruction techniques post-necrotising fasciitis infection, such as split thickness skin grafts, can result in aesthetically unacceptable results.[8] The case herein reported demonstrates that early definitive reconstruction following necrotising fasciitis of the thigh is feasible and can produce good results. Full thickness coverage of important structures, such as the femoral vessels and nerve was provided by the pedicled TRAM flap. Its large size (especially in parous women), and ready availability make the TRAM flap a suitable choice for reconstruction of relatively large defects as illustrated here. Furthermore the flap is easy and quick to raise in its pedicled variety. An added advantage in our case was the close proximity of donor and reconstruction site while the reach of the flap (pedicled reconstruction) eliminated the need for complex microvascular free tissue transfer. The use of TRAM or DIEP (deep inferior epigastric perforator) flaps for reconstruction of lower limb oncological and trauma defects is well documented,[9–15] but there is a paucity of literature reporting its use in reconstruction of necrotising fasciitis. Definitive flap reconstruction in necrotising fasciits has been reported at other sites with the use of either latisimus dorsi, trapezius or antero-lateral thigh myocutaneous flaps[16–18] with one case where definitive reconstruction was performed within a week of debridment[19] similar to our patient. Myocutaneous flap reconstruction yielded good functional and aesthetic results[16–19] as in our case.

Early stage reconstruction of necrotising fasciitis defects is not popular due to concerns relating to persistent disease activity and the possibility of infection occurring within the flap. Surgeons are

Fig. 3. The radical debridement defect extended posteriorly and required split-skin grafting as even the entire horizontal length of the TRAM flap could not completely wrap around the thigh. Please note the difference in contour between the anterior thigh and the posterior thigh.

worried that early utilisation of a flap can damage a desirable definitive reconstructive option. For reconstructive flaps to be successful and remain viable, therefore, the disease process must have been adequately treated and controlled with progression arrested or ceased; otherwise infection and destruction of the TRAM flap will result in loss of a good future option for reconstructive surgery. Radical debridement of the involved tissues is mandatory to enable survival of the patient and mimics a groin or neck dissection.[20] This case demonstrates that early definitive flap reconstruction as little as five days from initial debridement is feasible without the need for interim skin grafts and results in a good cosmetic outcome. The pedicled TRAM flap is a valuable option for reconstructing large defects within its reach.

Conflict of interest

None.

Funding

None.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Authors' contributions

All authors contributed to the writing and editing of this paper and the operation was performed by the senior author (CMM).

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References

1. Leitch HA, Palepu A, Fernandes CM. Necrotising fasciitis secondary to group A streptococcus. Morbidity and mortality still high. *Canadian Family Physician* 2000;**46**:1460–6. July.
2. Davies HD, McGeer A, Schwartz B, Green K, Cann D, Simor AE, et al. Invasive group A streptococcal infections in Ontario, Canada. Ontario Group A Streptococcal Study Group. *New England Journal of Medicine* 1996;**335**(8):547–54. August 22.
3. Holm SE. Invasive group A streptococcal infections. *New England Journal of Medicine* 1996;**335**(8):590–1. August 22.
4. Filbin MR, Ring DC, Wessels MR, Avery LL, Kradin RL. Case records of the Massachusetts General Hospital. Case 2-2009. A 25-year-old man with pain and swelling of the right hand and hypotension. *New England Journal of Medicine* 2009;**360**(3):281–90. January 15.
5. Golger A, Ching S, Goldsmith CH, Pennie RA, Bain JR. Mortality in patients with necrotising fasciitis. *Plastic and Reconstructive Surgery* 2007;**119**(May (6)):1803–7.
6. Hsiao CT, Weng HH, Yuan YD, Chen CT, Chen IC. Predictors of mortality in patients with necrotising fasciitis. *American Journal of Emergency Medicine* 2008;**26**(February (2)):170–5.
7. Childers BJ, Potyondy LD, Nachreiner R, Rogers FR, Childers ER, Oberg KC, et al. Necrotising fasciitis: a fourteen-year retrospective study of 163 consecutive patients. *American Surgeon* 2002;**68**(February (2)):109–16.
8. Schumacher H, Tehrani H, Irwin MS, Malata CM. Abdominoplasty as an adjunct to the management of peri-caesarian section necrotising fasciitis. *Journal of Plastic, Reconstructive and Aesthetic Surgery* 2008;**61**(July (7)):807–10. Epub 2007 May 15.
9. Gottlieb ME, Chandrasekhar B, Terz JJ, Sherman R. Clinical applications of the extended deep inferior epigastric flap. *Plastic and Reconstructive Surgery* 1986;**78**(December (6)):782–92.
10. Wellisz T, Sherman R, Nichter L, Romano JJ, Lorant J, Chandrasekhar B. The extended deep inferior epigastric pedicle flap for lower extremity reconstruction. *Annals of Plastic Surgery* 1993;**30**(May (5)):405–10.
11. Coessens BC, Van Geertruyden JP, Vico PG. Free TRAM flap for lower-extremity reconstruction. *Journal of Reconstructive Microsurgery* 1994;**10**(September (5)):305–11.
12. Koshima I, Nanba Y, Tsutsui T, Takahashi Y, Itoh S. Perforator flaps in lower extremity reconstruction. *Handchirurgie, Mikrochirurgie, Plastische Chirurgie* 2002;**34**(July (4)):251–6.
13. Senchenkov A, Thomford NR, Barone FE. Reconstruction of an extensive thigh defect with the paraumbilical TRAM flap. *Annals of Plastic Surgery* 2003;**51**(July (1)):91–6.
14. Van Landuyt K, Blondeel P, Hamdi M, Tonnard P, Verpaele A, Monstrey S. The versatile DIEP flap: its use in lower extremity reconstruction. *British Journal of Plastic Surgery* 2005;**58**(January (1)):2–13.
15. Parrett BM, Winograd JM, Garfein ES, Lee WP, Hornicek FJ, Austen Jr WG. The vertical and extended rectus abdominis myocutaneous flap for irradiated thigh and groin defects. *Plastic and Reconstructive Surgery* 2008;**122**(July (1)):171–7.
16. Yamasaki O, Nagao Y, Sugiyama N, Otsuka M, Iwatsuki K. Surgical management of axillary necrotizing fasciitis: a case report. *Journal of Dermatology* 2012;**39**:309–11.
17. Lembas L, Jethon J. Reconstruction in case of full thickness abdominal wall defects due to necrotizing fascitis—case report. *Polish Journal of Surgery* 2012;**84**(January (1)):44–8.
18. Chen HM, Cai ZG, Zhao FY, Wu J, Jiang RP. Reconstruction of a huge oral maxillofacial defect caused by necrotic fasciitis secondary to leukaemia. *Journal of Plastic, Reconstructive and Aesthetic Surgery* 2008;**61**(December (12)):e1–5.
19. Alexander K, Lawton G, Macquillan A. A pedicled latissimus dorsi myocutaneous flap for early reconstruction of cervicocranial necrotising fasciitis. *Indian Journal of Plastic Surgery* 2010;**43**(July (2)):224–5.
20. Nouraei SA, Hodgson EL, Malata CM. Cervicofacial necrotising fasciitis: management with neck dissection and topical negative pressure. *Journal of Wound Care* 2003;**12**(April (4)):147–9.